<u>What is claimed is</u>:

1 1.   An equalization system comprising:

2   a first equalizer to process a communication signal received from a

3 communication channel to generate an output;

4   a reduced alphabet determination unit to identify a reduced alphabet based on

5 said output of said first equalizer; and

6   a reduced alphabet MLSE equalizer to detect data in said communication signal

7 received from said communication channel based on said reduced alphabet identified

8 by said reduced alphabet determination unit.

1 2.   The equalization system of claim 1, wherein:

2   said first equalizer has a length that is less than an anticipated memory length

3 of said communication channel.

1 3.   The equalization system of claim 1, wherein:

2   said first equalizer includes a reduced length MLSE equalizer.

1 4.   The equalization system of claim 1, wherein:

2   said first equalizer includes a delayed decision feedback sequence estimation

3 (DDFSE) equalizer.

1 5.   The equalization system of claim 1, wherein:

2   said first equalizer includes a linear equalizer.

1 6.   The equalization system of claim 1, wherein:

2   said first equalizer includes an M-Algorithm equalizer.

1 7.   The equalization system of claim 1, wherein:

2   said first equalizer includes an SA(B,C) detector.

1   8.   The equalization system of claim 1, wherein:

2   said reduced alphabet MLSE equalizer is a full-state MLSE equalizer.

1   9.   The equalization system of claim 1, wherein:

2   said output of said first equalizer includes a plurality of soft symbols each

3   having a corresponding probability, wherein said reduced alphabet determination unit

4   selects the K highest probability soft symbols from said output as said reduced

5   alphabet, where K is a positive integer.

1   10.   The equalization system of claim 1, wherein:

2   said output of said first equalizer includes a single symbol, wherein said reduced

3   alphabet determination unit selects K-1 symbols from a full alphabet that are closest in

4   distance to said single symbol as said reduced alphabet, where K is a positive integer

5   greater than 1.

1   11.   The equalization system of claim 1, wherein:

2   said reduced alphabet determination unit identifies a reduced alphabet having

3   K symbols, where K is a positive integer, said equalization system further comprising

4   an alphabet length determination unit for determining a value for K based on an output

5   of said first equalizer.

1   12.   The equalization system of claim 11, wherein:

2   said alphabet length determination unit determines a value for K on an input

3   symbol by input symbol basis.

1   13.   The equalization system of claim 11, wherein:

2   said alphabet length determination unit determines a value for K based on a

3   probability associated with a highest probability soft symbol output by said first

4   equalizer for a particular input symbol.

1   14.   The equalization system of claim 11, wherein:

2   said alphabet length determination unit determines a value for K so that a

3   cumulative probability of the K highest probability soft symbols output by said first

4   equalizer exceeds a threshold value.

1   15.   A method for performing equalization within a communication system,

2   comprising:

3   first processing a communication signal using a first equalizer;

4   determining a reduced alphabet based on a result of said first processing; and

5   second processing said communication signal using a reduced alphabet MLSE

6   equalizer, said reduced alphabet MLSE equalizer operating on said communication

7   signal based on said reduced alphabet.

1   16.   The method of claim 15, wherein:

2   said first equalizer includes a reduced state MLSE equalizer.

1   17.   The method of claim 15, wherein:

2   first processing includes generating a plurality of soft symbols having

3   associated probabilities.

1   18.   The method of claim 17, wherein:

2   determining a reduced alphabet includes selecting the K highest probability soft

3   symbols from said plurality of soft symbols as the reduced alphabet, where K is a

4   positive integer.

1   19.   The method of claim 15, wherein:

2   first processing includes generating a hard symbol and determining includes

3   selecting the K-1 symbols within a full alphabet that are closest in distance to said hard

4   symbol, where K is a positive integer greater than 1.

1   20.   The method of claim 15, wherein:

2   determining a reduced alphabet includes determining an alphabet of size K,

3   where K is a positive integer, said method further comprising redetermining K for

4   successive input symbols within said communication signal.

1   21.   The method of claim 15, wherein:

2   second processing includes processing said communication signal in a full-state,

3   reduced alphabet MLSE equalizer.

1   22.   A computer readable medium having program instructions stored thereon for

2   implementing, when executed within a digital processing device, a method for

3   performing equalization within a communication system, said method comprising:

4   first processing a communication signal using a first equalizer;

5   determining a reduced alphabet based on a result of said first processing; and

6   second processing said communication signal using a reduced alphabet MLSE

7   equalizer, said reduced alphabet MLSE equalizer operating on said communication

8   signal based on said reduced alphabet.

1   23.   The computer readable medium of claim 22, wherein:

2   determining a reduced alphabet includes determining a reduced alphabet for

3   each input symbol within said communication signal.

1   24.   The computer readable medium of claim 22, wherein:

2   determining a reduced alphabet includes determining a reduced alphabet having

3   a size that is related to a symbol probability determined during first processing.

1   25.   An equalization system comprising:

2   a reduced state, full-alphabet MLSE equalizer to process a communication

3   signal received from a communication channel to generate a plurality of soft symbols

4   for a first input symbol within said communication signal, said plurality of soft symbols

5   having corresponding symbol probabilities;

6   a symbol selection unit to select symbols from said plurality of soft symbols to

7   form a reduced alphabet for said first input symbol; and

8   a full-state, reduced alphabet MLSE equalizer to process said communication

9   signal based on said reduced alphabet.

1   26.   The equalization system claimed in claim 25, wherein:

2   said symbol selection unit selects, for said first input symbol, the K highest

3   probability soft symbols output by said reduced state, full-alphabet MLSE equalizer to

4   form said reduced alphabet, where K is an integer greater than 1.

1   27.   The equalization system claimed in claim 26, comprising:

2   an alphabet size determination unit to determine a value for K for each input

3   symbol within said communication signal based on symbol probabilities output by said

4   reduced state, full-alphabet MLSE equalizer.

1   28.   A communication device, comprising:

2   means for receiving a communication signal from a communication channel,

3   said communication signal including undetected input symbols selected from a full

4   symbol alphabet;

5   means for determining, for individual input symbols within said communication

6   signal, a reduced symbol alphabet having symbols that are more likely to be an actual

7   transmitted symbol than other symbols within said full symbol alphabet; and

8   a full-state MLSE equalizer for processing said communication signal based on

9   said reduced symbol alphabet.

1   29.   The communication device of claim 28, wherein:

2   said means for determining includes means for dynamically adjusting a size of

3   said reduced symbol alphabet for successive input symbols within said communication

4   signal.

1   30.   The communication device of claim 28, wherein:

2   said means for determining includes a reduced complexity equalizer.